IN THE EUROPEAN PATENT OFFICE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY (IPEA/EP)

Applicant(s): DOW GLOBAL TECHNOLOGIES INC.

(Webin Liang et al.)

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For:

FILMS WITH SUPERIOR IMPACT RESISTANCE AND IMPROVED

CATASTROPHIC FAILURE RESISTANCE UNDER HIGH STRAIN

RATE

REFERENCE:

63385B

Authorized Officer: D. Hutton

RESPONSE TO WRITTEN OPINION

Dear Sir/Madam:

In response to the first Written Opinion by the International Preliminary Examining Authority mailed on March 14, 2005.

Please amend the claims as indicated. Replacement pages 9-11 are attached.

1. A stretch film having three or more layers wherein:

A) at least one layer comprises a polyethylene characterized as having:

i) a density from about 0.9 g/cc to about 0.96 g/cc;

ii) a melt index from about 0.5 g/10 minutes to about 10 g/10 minutes,

measured in accordance with ASTM D 1238, condition 190°/2.16 kg; and

iii) a molecular weight distribution from about 2.5 to about 4.5; and

B) wherein at least one non-surface layer comprises at least one propylene polymer; and

C) wherein the stretch film is characterized as having an ultimate stretch of at least 200%, a Dart A of at least 430 gms/mil and a CF of 5% or less.

14. AThe -stretch film of claim 1 comprising at least one layer comprising an ethylene polymer, wherein the film has a tensile stress at break of at least 5000 psi-and an ultimate stretch of at least 200%, and a CF of 5% or less.

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FERRULE WITH RELIEF TO REDUCE GALLING CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of United States Patent application serial no. 09/054,186 filed on April 2, 1998, which is a continuation-in-part of United States Patent application serial no. 08/834,255 filed on April 15, 1997, now United States patent no. 5,882,050, the entire disclosures of which are fully incorporated herein by reference.

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Background of the Invention

The subject invention is directed to the art of ferrule type tube

fittings. More particularly, the invention concerns a two ferrule fitting wherein
the rear ferrule is designed to reduce the torque required to rotate the associated
nut and to also reduce galling between the rear ferrule and the interior surface of
the drive nut. The invention may also be applied in a single ferrule fitting.

A commercially available and highly successful two ferrule fitting used for tubing is illustrated in FIGS. 1 and 1A. FIG. 1 shows the fitting components in a finger tight position preparatory to final tightening, whereas FIG. 1A shows the fitting after final tightening. As shown, the fitting comprises a body 10 having a cylindrical opening 12 counterbored for receiving tube end 13. A tapered, frusto-conical camming mouth 14 is located at the axial outer end of the counterbore. A front ferrule 16 having a smooth, cylindrical inner wall 18 is closely received on the tube. The front ferrule has a frusto-conical outer surface 20 to be received in the camming mouth.

Associated with the front ferrule 16 and located axially outward therefrom is a rear ferrule 22 configured as shown with a tapered nose portion 24 and a rear flange 26 having an inclined end surface 28. The inclined end

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surface of the rear ferrule 22 provides a radial component as well as an axial component of the pull-up forces acting on the end surface as will be apparent to those skilled in the art. The tapered nose 24 enters a tapered camming surface in the rear surface of the front ferrule.

The ferrules 16, 22 are enclosed by a drive nut member 30 threaded to the body 10. During tightening and make-up of the fitting, the inner end face, flange, or shoulder 32 of the nut acts against the rear wall end surface 28 of the rear ferrule to drive the ferrules forwardly into the fully engaged position shown in FIG. 1A.

The small diameter portion or nose of the rear ferrule is dimensioned so that it plastically deforms during make-up of the fitting. This action is desirable since it results in tight gripping engagement of the outer wall of the tubing. The thickness of the nose portion cannot be reduced to an extent that the rear ferrule deforms too much and only the rear ferrule adequately grips the outer wall of the tubing. That is, the two ferrule assembly requires desired deformation of both the front and rear ferrules for the gripping and sealing capabilities that have made this two ferrule assembly a commercially successful product. On the other hand, the thickness of the nose of the rear ferrule cannot be enlarged to such an extent that it results in a structural arrangement that is too stiff and does not permit the desired rear ferrule deformation.

A more complete description and understanding of the conventional two ferrule phase controlled sequential gripping action resulting from the inclined rear surface and the interaction of the front and rear ferrules is

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set forth in United States Patent no. 3,103,373 issued to Lennon, et al., the entire disclosure of which is fully incorporated herein by reference.

Accordingly, it will be recognized by those skilled in the art that a predetermined wall thickness of the nose of the rear ferrule is desired that achieves the desired gripping of the tube and cooperates with the front ferrule in such a manner that it achieves its desired goals of gripping and sealing the tube.

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It is also recognized that operators of fluid systems test the system prior to a production run by pressurizing the system to an appropriate factor times the rated system pressure. In this manner, the operator can easily detect whether the fluid system is sealed, i.e. that there are no leaks. With this knowledge, the manufacturer can provide a fitting in which the nose of the rear ferrule will not have any additional plastic deformation at the elevated test pressure. Accordingly, the elevated test pressure is used to determine the desired wall thickness of the nose portion of the rear ferrule to achieve the desired amount of deformation of the nose and permit the front and rear ferrules to properly grip and seal with the outer wall of the tube.

It has also been found that galling of the drive nut sometimes occurs in the drive face area of engagement between the inner end face of the drive nut and the rear wall of the rear ferrule. After analysis, it is believed that the axial thrust or pull-up force between the front and rear ferrule is essentially parallel to the axis of the fitting. This axial thrust causes the rear corner region of the rear ferrule to selectively concentrate pull-up stress at the inside drive surface of the nut particularly in a localized area to produce the galling. This

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- 13. The stretch film of claim 1 wherein the film is made at an output rate of at least about 6 pounds/hour/inch of die width.
- 14. The stretch film of claim 1, wherein the film has a tensile stress at break of at least 5000 psi.
 - 15. The stretch film of Claim 14 further characterized as having a Dart A of at least 430 gms/mil
- 10 16. (Cancelled)
 - 17. (Cancelled)
- 18. A stretch film having an ultimate stretch of at least 200%, a Dart
 15 A of at least 430 gms/mil and a CF of 5% or less, and comprising at least
 three layers, wherein a non-skin layer comprises a propylene polymer, and
 at least one other layer comprises an ethylene polymer composition,
 wherein the ethylene polymer composition comprises:
- (A) from about 10 percent (by weight of the total composition) to 20 about 95 percent (by weight of the total composition) of at least one ethylene interpolymer having:
 - (i) a density from about 0.89 g/cm3 to about 0.935 g/cm3,
 - (ii) a melt index (I_2) from about 0.001 g/10 minutes to about 10 g/10 minutes, preferably from about 0.001 g/10 minutes to about 1 g/10 minutes, more preferably from about 0.001 g/10 minutes to about 0.5 g/10 minutes,
 - $\left(\text{iii} \right)$ a slope of strain hardening coefficient greater than or equal to 1.3, and
- $\mbox{(iv) a Composition Distribution Index (CDBI) greater than 50} \\ \mbox{30 percent; and}$
 - (B) from about 5 percent (by weight of the total composition) to about 90 percent (by weight of the total composition) of at least one ethylene polymer having a density from about 0.93 g/cm³ to about 0.965 g/cm³ and a linear polymer fraction, as determined using temperature rising elution fractionation (TREF).
 - 19. A stretch film having an ultimate stretch of at least 200%, a Dart A of at least 430 gms/mil and a CF of 5% or less, and comprising at least three layers, wherein a non-skin layer comprises a propylene polymer, and at least one other layer comprises an ethylene polymer composition, wherein the ethylene polymer composition comprises:
 - (A) from about 10 percent (by weight of the total composition) to about 100 percent (by weight of the total composition) of at least one ethylene interpolymer having:
 - (i) a density from about 0.89 g/cm³ to about 0.935 g/cm³,

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- (ii) a melt index (I_2) from about 0.001 g/10 minutes to about 10 g/10 minutes,
- (iii) a molecular weight distribution, Mw/Mn, from about 2 to about 4, and
- 5 (iv) a Composition Distribution Index (CDBI) greater than 50 percent; and
 - (B) optionally, from about 5 percent or less (by weight of the total composition) to about 90 percent (by weight of the total composition) of at least one ethylene polymer having a density from about 0.93 g/cm^3 to about 0.965 g/cm^3 and a linear polymer fraction, as determined using temperature rising elution fractionation (TREF).
 - 20. The stretch film of claim 19 wherein (A) has a melt index from about 0.001 g/10 minutes to about 1 g/10 minutes.
 - 21. The stretch film of claim 19 wherein (A) has a melt index from about $0.001~\mathrm{g}/10$ minutes to about $0.5~\mathrm{g}/10$ minutes.
- 22. A stretch film having an ultimate stretch of at least 200%, a Dart
 20 A of at least 430 gms/mil and a CF of 5% or less, and comprising at least
 three layers, wherein a non-skin layer comprises a propylene polymer, and
 at least one other layer comprises an ethylene polymer composition,
 wherein the composition comprises:
 - (A) an interpolymer having a narrow molecular weight distribution and a narrow composition distribution breadth index (CDBI), defined as the weight percent of the polymer molecules having a comonomer content within 50 percent of the median total molar comonomer content, which is greater than about 50 percent and a degree of branching less than or equal to 2 methyls/1000 carbons of about 15 percent (by weight) or less and having an aluminum residue content of less than or equal to about 250 ppm present in the interpolymer composition, said interpolymer A being present in an amount of from about 15 to about 85% by weight based on the combined weight of Components A and B; and
- (B) an interpolymer having a broad molecular weight distribution and a broad composition distribution and a degree of branching less than or equal to 2 methyls/1000 carbons of about 10 percent (by weight) or more and a degree of branching greater than or equal to 25 methyls/1000 carbons of from about 25 percent (by weight) or less present in the interpolymer composition, said interpolymer B being present in an amount of from about 15 to about 85% by weight based on the combined weight of Components A and B.
 - 23. The film of any of claims 18-22, wherein the ethylene polymer composition comprises a skin layer.